



Capturing the Social Demographics of Hidden Sexual Minorities: An Internet Study of the Transgender Population in the United States

B. R. Simon Rosser, J. Michael Oakes, Walter O. Bockting, Michael Miner

Abstract: As part of a larger study, we investigated the feasibility of using Internet research to capture the demographic characteristics of a largely closeted sexual minority and to report such characteristics in the first national study of transgender persons ever attempted in the United States. To achieve a nonclinical national sample, online convenience sampling was used. Of 1,373 surveys received, 1,229 (90%) were deemed complete and from unique individuals self-identifying as transgender, 18 years or older, and U.S. residents. Participation approximated that predicted by the U.S. Census (2000). Comparison with census data identified the sample as younger, White (non-Hispanic), single, more educated but with less household income, living in smaller towns to medium-sized cities, and less affiliated with traditional Christian denominations. Demographic characteristics differed significantly by both gender and transgender status. The challenge of achieving demographically representative sampling online, as well as implications for future research and policy, are discussed.

Key words: transsexuals; social epidemiology; e-public health; online sampling; demographic characteristics

Demography is defined as the scientific study of the size, structure, and composition of populations, as well as of population dynamics (Yaukey & Anderton, 2001). Related is the field of social epidemiology, which investigates how social interactions and collective human activities (e.g., discrimination, poverty) affect people's health (Oakes & Kaufman, 2006). Both fields are intrinsic to an evidence-based approach to public health and preventive medicine and include such areas as identifying health risks and resiliencies, looking at disparities in access to health services and in health care, and collecting surveillance data to inform policies for promoting health and preventing disease. In this article, we define *e-public health* as the promotion of health and prevention of

disease at the community or population level using Internet-based research methodologies, interventions, and policies. An emerging subdiscipline, e-public health encompasses online health promotion strategies for the public or targeted communities; the study of how Internet use and e-communication may change health risk (e.g., online sexual liaisons); and health promotion and disease prevention in virtual communities, meaning populations who meet only online and share common characteristics or identification as an Internet-based group (e.g., online support and social groups).

The Internet is transforming the way people organize and, hence, the structure of virtual populations. What a generation ago were deemed in popular culture to be so-called

Address correspondence concerning this article to B. R. Simon Rosser, HIV/STI Intervention and Prevention Studies (HIPS) Program, Division of Epidemiology and Community Health, University of Minnesota School of Public Health, 1300 S. 2nd Street, Suite 300, Minneapolis, MN 55454. E-mail: rosser@umn.edu; J. Michael Oakes, HIPS Program, 1300 S. 2nd Street, Suite 300, Minneapolis, MN 55454. E-mail: oakes@epi.umn.edu; Walter O. Bockting, Program in Human Sexuality, Department of Family Medicine and Community Health, University of Minnesota Medical School, 1300 S. 2nd Street, Suite 180, Minneapolis, MN 55454. E-mail: bocktoo1@umn.edu; Michael Miner, Program in Human Sexuality, Department of Family Medicine and Community Health, University of Minnesota Medical School, 1300 S. 2nd Street, Suite 180, Minneapolis, MN 55454. E-mail: minero01@umn.edu

minorities, deviates, or fringe groups are in the Internet era proving to be populations of significant size drawn together by a common identity, interest, or bond. Individuals who in the past may have experienced significant social isolation, marginalization from mainstream society, and internalized shame regarding their sexual interests or identity now can tap into a ready source of peer support and common bond—both of which can be hypothesized as having a normalization effect—by finding others like them on the Internet (Mustanski, 2001). Whether it is a virtual support group for breast cancer or prostate surgery survivors, a website for voyeurs to share erotic pictures, an online travel service for gay and lesbian couples, a web company selling products to enhance sexual desire or performance, or a site specializing in specific fetishistic desires—for better and, in some cases, perhaps for worse, virtual communities have formed around specific sexual interests, desires, identities, and communities.

The term *sexual minority* has traditionally been used to refer to gay, lesbian, bisexual, and sometimes transgender (GLBT) persons, communities, and populations. However, we propose a broader public health definition that would include anyone or any population whose sexual health is compromised or changed because of their sexual behavior or minority sexual identity status. The broader definition encompasses a wide range of others, including intersex persons; disabled people; those living with HIV, sexually transmitted infections, and other infections (both treatable and chronic); those with specific sexual dysfunctions, disorders, or paraphilias; and those who because of lifestyle (e.g., members of the armed forces on active duty), medical history (e.g., prostate and breast cancer survivors), and demographic or socioeconomic status (e.g., racial minorities, rural residents, undocumented immigrants) face specific sexual health challenges and greater disparities in sexual health care (U.S. Surgeon General, 2001). Many of these sexual-minority populations appear to be early and enthusiastic adopters of the Internet, with virtual communities providing social and sometimes sexual support and, thus, potentially changing the way a minority sexual interest, behavior, or identity is experienced and expressed.

Transgender persons represent one such largely hidden or closeted sexual minority. *Transgender* is a broad term used to refer to a diverse group of individuals who cross or transcend culturally defined categories of gender (Bockting, Robinson, & Rosser, 1998). Although transgender identities encompass ever-evolving categories, the four largest subcategories include transsexuals, cross-dressers (sometimes also called transvestites), drag kings and queens (sometimes also termed male and female impersonators), and a rich variety of other terms denoting individuals who do not fit

into traditional categories of male or female (see the Method section of this article, under the heading *Participants*, for definitions). Transgender individuals are diverse in sexual orientation: Male-to-female transsexuals may be attracted to men, women, or both; most (but not all) female-to-male transsexuals are predominantly attracted to women; male cross-dressers usually are heterosexual; and drag kings and queens are typically lesbian or gay (Chivers & Bailey, 2000; Devor, 1993; Docter & Fleming, 2001; Lawrence, 2005).

As a hidden or closeted sexual minority, transgender persons represent a unique challenge to research and health care (Boehmer, 2002; Gay and Lesbian Medical Association, 2001). A scientific literature review (1966 to present) abstracted from PubMed and MEDLINE was carried out to identify the known demographics of the transgender population. However, we could not find any previous demographic studies of the transgender population in the United States. The studies that do exist have focused on more accessible subgroups of the transgender population (e.g., clinical samples, inner-city sex workers), used limited sample frames, lacked standardized sociodemographic measures, and appear to have collected cross-sectional data over long time periods. These limitations are of concern because they may bias results and skew how a population or community is perceived.

Among the transgender population, transsexuals routinely seek clinical intervention and therefore are the subgroup most accessible to researchers and thus most widely studied. Several studies (Bakker, van Kesteren, Gooren, & Bezemer, 1993; Eklund, Gooren, & Bezemer, 1988; Olsson & Möller, 2003; Tsoi, 1992; van Kesteren, Gooren, & Megens, 1996; Weitze & Osburg, 1996; Wilson, Sharp, & Carr, 1999) have focused on estimating incidence and prevalence rates of transsexuals based on national surgical registries and lists of individuals seeking sex-reassignment surgery in gender-identity clinics. Endocrine studies of these individuals (Elbers et al., 2003; Feldman, 2002; Giltay & Gooren, 2000; Jin, Turner, Walters, & Handelsman, 1996; Levy, Crown, & Reid, 2003; Schlatterer et al., 1998; Slabbekoorn, van Goozen, Megens, Gooren, & Cohen-Kettenis, 1999) have focused on the morbidity and mortality associated with hormone therapy.

A few countries have reported widely varying incidence rates for transsexual persons. In Germany, clinic-based studies (Garrels et al., 2000) described a national sample of 1,785 transsexual patients presenting for sex assignment over 24 years (an average of 74 people per year) and indicated that the ratio of male-to-female versus female-to-male German transsexuals appeared to be decreasing over time. In the Netherlands, the prevalence

of male-to-female and female-to-male transsexuals presenting for treatment was 1 in 11,900 and 1 in 30,400, respectively (Bakker et al., 1993). As summarized by Olsson and Möller (2003), international reports on the annual incidence (per 100,000) and sex ratio (male:female) of persons over 15 years of age requesting sex reassignment included Australia (.58; ratio 5:1); Denmark (.21; ratio 2.8:1); England and Wales (.17–.26; ratio 1:1); Germany (.21–.24; ratio 2.3:1); Singapore (1.58; ratio 2.9:1); and Sweden (.15–.19; ratio 1:1). However, these statistics were based on studies varying over a 40-year period, typically involved a small annual incidence, addressed only the phenomenon of transsexuals requesting sex reassignment, were restricted to countries that keep national databases on this information, and relied on clinic-based data, which vary in quality. The United States lacks any national surveillance data assessing the incidence of transsexualism. Furthermore, because transsexualism is only one part of the larger phenomenon of transgenderism, knowledge about transgender people in the United States relies on anecdotal information, clinical samples, and some localized community-based samples.

Clinical experience indicates that transgender individuals may present at any age for clinical intervention (including but not limited to sex-reassignment services). However, a greater number of male-to-female (as opposed to female-to-male) individuals do not present for transgender-specific health care until later in life (ages 40 and over). This phenomenon appears to be due, at least in part, to the fact that a subgroup of heterosexual cross-dressers over the course of their lifetime gradually progress from cross-dressing in the privacy of their homes, to cross-dressing in public, to eventually identifying as transsexual and contacting a clinician to pursue sex reassignment (Docter, 1988). Prior to identifying as transsexual and pursuing sex reassignment, these individuals, like most cross-dressers, outwardly conformed to prevailing gender norms, climbed up the socioeconomic ladder by obtaining their education and pursuing a career, heterosexually married, and raised children.

A number of psychosexual studies of transgender persons (Clements-Nolle, Marx, Guzman, & Katz, 2001; Kellogg, Clements-Nolle, Dilley, Katz, & McFarland, 2001; Kenagy & Hsieh, 2005; Nemoto, Operario, Keatley, Han, & Soma, 2004; Simon, Reback, & Bemis, 2000; Spizzichino et al., 2001) have sought either to identify HIV risk using local samples in which transgender sex workers were overrepresented to estimate HIV incidence and prevalence or to enumerate broader mental health and health access concerns. Local community-based studies employing convenience samples (Bockting & Avery, 2005) have reliably identified some transgender groups as at extremely high risk for HIV (from

14% to 63%). However, these samples may overrepresent sex workers, bar patrons, and other urban-dwelling transgender persons who are more out, more obviously gender nonconforming, and, thus, more easily identifiable and accessible to researchers. For example, Nemoto et al. (2004) recruited 332 male-to-female transgender persons of color with a history of sex work from a range of community venues in San Francisco; 46% of the sample was referred to the researchers by AIDS service organizations. In this study, 26% of the participants reported being HIV positive, and those who had engaged in unprotected receptive anal intercourse ranged from 12% to 47% depending on type of partner (primary, casual, or commercial).

Similarly, studies using clinical or local community samples have identified mental health challenges in this population such as substance abuse, depression, and suicidal ideation and attempts. For example, Bockting, Robinson, Forberg, and Scheltema (2005) recruited 181 transgender intervention participants via clinics and transgender community organizations in Minnesota and found that 21% had recently abused alcohol, 16% used illegal drugs, 61% reported depression, and 52% reported having considered or attempted suicide in the last 3 years. Finally, despite limited research on the availability of physicians and mental health specialists who are knowledgeable about transgender health, it is clear that providing accessible, competent, sensitive health care to transgender individuals is a policy concern. Such care appears to be restricted to a few specialized clinics and health care professionals, almost always situated in large urban settings (Bockting & Avery, 2005; Lombardi, 2001). A review of clinics and care providers involved in the World Professional Association for Transgender Health (2006) confirms that most transgender-sensitive health care is available only in larger metropolitan areas.

The dangers of relying solely on clinic-based and case study information as the foundation for public policy may be seen in two examples. Until 1973, when the American Psychiatric Association declassified homosexuality as a mental illness, most health professionals and scientists, based on considerable clinical research and individual case studies, concluded a relationship between homosexuality and psychopathology. As researchers have since discovered, these studies were woefully flawed and rife with bias (Bayer, 1987; Freedman, 1971). Two sets of studies (Hooker, 1957, 1958; Kinsey, Pomeroy, & Martin, 1948; Kinsey, Pomeroy, Martin, & Gebhard, 1953) were critical in transforming understanding and were seminal to sexuality research in the United States. The Kinsey research, the first large studies of their kind to be published, provided the first population estimates that showed

homosexuality (among other sexual behaviors) to be relatively common. Hooker's work was seminal in a different way. By studying nonclinical samples of homosexuals, she was able to demonstrate no significant differences on almost all of the supposed pathology measures. Critical to sexuality research is an important take-home lesson: Neither study was perfect, the Kinsey studies being far from representative and Hooker's studies having a very small sample size. Nevertheless, application of new methods changed the way sexuality was conceived by science and medicine.

A second example demonstrates the urgent need for more research using Internet-based methods. In 2000, sexually transmitted disease (STD) clinic studies (Bull, McFarlane, & Rietmeijer, 2001; Kim, McFarland, Yu, & Klausner, 2000; McFarlane, Bull, & Rietmeijer, 2000) in Denver, Colorado, and in San Francisco were among the first to identify a correlation between Internet hookups and STDs for men who have sex with men. These, together with Klausner, Wolf, Fischer-Ponce, Zolt, and Katz's (2000) contact-tracing of 7 syphilis cases in San Francisco to a chat room, were sufficient to identify an association between Internet use and increased risk for HIV-STD infection. Later studies comparing online and offline liaisons showed reliably that the frequency of both unsafe sex and safer sex is increased in Internet liaisons; thus, the relative risk does not appear to change (Pequegnat et al., in press; Rosser et al., in press).

Taken together, these examples show the importance of studying large samples (even if not representative) and, in particular, of using both clinical and nonclinical studies to inform policy. As in all science, when different methods yield the same result, confidence about the validity, reliability, and temporal stability of results is enhanced; conversely, when different methods yield consistently different results, the limitations of particular methods can be identified. Internet-based research with sexual minorities would also seem prudent to avoid circular argumentation caused by overreliance on one method. For example, transgender access to health care may easily be seen as a problem specific to urban areas if the only studies conducted are in such settings.

In summary, it appears urgent to investigate whether the demographic characteristics of hidden sexual minorities can be enumerated using Internet methods. Demonstration feasibility studies are a necessary first step, one we hope will be superseded over time by ever more sophisticated and rigorous research designs. For this study, we prioritized transgender persons in the United States as an ideal hidden sexual minority to study based on need: Their demographic characteristics are

unknown, and clinical studies have identified significant—and, in some cases, unique—physical, mental, and sexual health needs, risks, and health care access challenges. Moreover, transgender persons were among the first sexual-minority group to use the Internet to find similar others, create opportunities for peer support, and develop a sense of community.

As part of a wider study, we sought to investigate the demographic characteristics of an online population of transgender persons. Our purpose for this particular article was twofold. First, we sought to investigate whether Internet-based studies can recruit populations largely hidden from conventional research. Specifically, we aimed to (a) compare the sample demographics with the national census so as to identify possible population characteristics and (b) compare our findings with studies on other Internet-based populations to identify common strengths and biases in this approach. The first comparison is important because the census is considered the gold standard against which all demographic differences are identified; comparison with other Internet-based studies is needed for identifying methodological strengths and limitations. Second, to address the gap in demography of transgender persons, we proposed the first national study of transgender individuals ever attempted in the United States. We sought to (a) investigate whether demographic differences exist across gender and between expressions of transgender identity in this population and (b) identify the health and social policy implications of our findings. A priori, based on our literature review and our experience in providing services to transgender persons (Bockting, Robinson, Benner, & Scheltema, 2004), we hypothesized that across sex, male-to-female transgender persons would be older, more educated, and more likely to have children than female-to-male transgender individuals. Across type of transgender identity, we hypothesized that transsexuals would be the oldest and least employed group, that more drag queens and kings would live in metropolitan areas, and that cross-dressers would be more educated, religious, likely to be married, and likely to have children.

Method

Participants

In designing an Internet study of a hidden population, we considered various methods of random sampling but encountered two significant barriers. First, random sampling is considered a standard beyond the current state of Internet research, principally because person, space, and

time dimensions are more relative in Internet-based studies than in offline studies (Pequegnat et al., in press). Individuals can have multiple handles (user names), so unique subject identification is a challenge. Also, because the World Wide Web is evolving rapidly, accurate enumeration of and sampling from relevant websites is impossible. In addition, measuring users' time online becomes difficult because people can be active on multiple websites simultaneously.

Second, randomly sampling a hidden population of unknown size with no known demographic data is a novel challenge to demography because such a population has no sample frame. Additionally, *transgender* is a somewhat porous term that does not mean the same thing to everyone—although some might use this label, not everyone who might fit researchers' definition of *transgender* would embrace the term. Furthermore, the use of such labels can have a temporal aspect: For example, transsexuals often embrace specific labels (e.g., *transman*) prior to surgery only to reject them in favor of more general descriptions afterward (e.g., female, male).

We decided that a more reasonable, achievable first step was to demonstrate feasibility by first recruiting a large sample and then carefully studying its demographics. We hope that future studies can replicate this methodology to demonstrate reliability and that others can compare online and offline samples to identify any bias inherent in online methods.

Participants were recruited via banners placed on transgender community websites and in chat rooms, as well as messages posted to online mailing lists, journals, and forums. Banners displayed a revolving set of messages, including "A diverse community requires distinctive support," "Transgender health survey," and "TG Study: Click here to get started." Screened by self-report, participants who self-identified as transgender, age 18 or older (because of the sensitive and explicit nature of the sexuality questions), and living in the United States were included in the study. Sampling was stratified by type of transgender identity: transsexual, cross-dresser, drag queen or king, or other (e.g., transgenderist, bigender, gender queer, two-spirit) in order to obtain a sample representative of the gender diversity within this community. A total of 1,373 participants enrolled; of those, 1,273 (93%) provided completed surveys. To confirm respondents' eligibility, survey validity, and uniqueness of data, a computerized *deduplication, cross-validation* protocol compared each respondent's e-mail and IP address, user name, password, date of birth and age, zip code, and completion time with other participants' responses to identify those who may have participated more than once or provided

false or unreliable data (Konstan, Rosser, Ross, Stanton, & Edwards, 2005; Rosser et al., 2005). Using this protocol, 44 surveys were identified as suspicious and excluded from the study. The remaining 1,229 participants, representing 90% of enrollees, comprised the final sample.

Measures

This study was part of a larger investigation focusing on the influence of gender on HIV risk. The entire online survey took about 55 minutes to complete and contained 10 sections covering such topics as demographics, gender identity, sexual behavior, social support, substance use, mental health, and physical health. To permit comparison with the general U.S. population, demographic questions were chosen from the U.S. Census (2000) and then adapted if necessary for the transgender population. For example, the question on legal marital status needed clarification to cover emerging categories (e.g., civil unions) not covered in Census 2000.

Natal sex of participants was assessed with the question "The sex that I was assigned at birth (the sex on my original birth certificate) is: (1) Male or (2) Female."

In order to assess type of transgender identity, participants were asked to choose one of the following descriptions that best described their transgender identity:

- (1) Transsexual: "I was assigned male/female at birth and desire or have had hormone therapy and/or sex reassignment surgery to feminize/masculinize my body."
- (2) Cross-dresser or transvestite: "I wear clothes and adopt behaviors associated with the other sex for emotional or sexual gratification."
- (3a) Drag: "I do drag, dress up in women's/men's clothes, and adopt a very feminine/masculine presentation."
- (3b) (Fe)Male Impersonator: "I am male/female and impersonate women/men, usually for entertainment."
- (4) Other: "My transgender identity does not fit in the above categories, such as transgenderist (I live in the gender role associated with the other sex, may take hormones but do not desire sex reassignment surgery), bigender (I identify as both man and women), gender queer, two-spirit, etc."

Procedure

By clicking on a banner or link, participants could go directly to the transgender study website. The home page provided access to information about the researchers, a list of transgender community advisory board members, frequently asked questions, an e-mail address and toll-free telephone number for those who had questions, and referral numbers to our Internal Review Board's Research

Subjects' Advocacy Line. Before starting the survey, participants were guided through a chunked online consent process explaining the purpose of the study, what would be asked of participants, and risks and benefits (Gurak & Rosser, 2003). Subsequently, participants were screened for their eligibility. Those eligible were asked to register with an e-mail address, user name, and password; participants could opt out of providing an e-mail address and still participate in the study. Upon completion of the survey, participants received compensation in the form of a \$30 online gift certificate.

Analysis

A priori, we determined that comparing the transgender population with the general population using U.S. Census data required no formal statistical tests. Given the magnitude of difference in size between our survey (1,229 persons) and the census (300 million people), and given that the census is the gold standard representing the entire U.S. population, such statistical testing is neither appropriate nor meaningful. Instead, comparisons can be made directly. To compare demographic characteristics by sex and type of transgender identity, one-way ANOVAs or chi-square tests

were employed, depending on whether the measure was continuous or discrete. All statistical tests were conducted using Stata v8 and ArcMAP software.

Results

As shown in Figure 1, respondents had a wide geographic distribution across the United States. Analysis of zip codes showed participation from 48 states (all except Montana and South Dakota), the District of Columbia, Puerto Rico, the Virgin Islands, and the military zip code for Europe. The proportion of participants from the 15 most populated states in the United States, with minor exceptions, approximated the relative population size of those states (see Table 1). For Colorado, Minnesota, Missouri, and Oregon, participants appeared to be over-represented relative to population size.

As compared to the general population in U.S. Census 2000, the 1,229 transgender persons in this study as a group were younger; were more likely to identify themselves as White (non-Hispanic) or multiracial (and less likely to identify as either Black or Hispanic); were more educated but reported less household income; were more likely to be single, never married, or divorced (and

Figure 1. Geographic distribution of respondents.

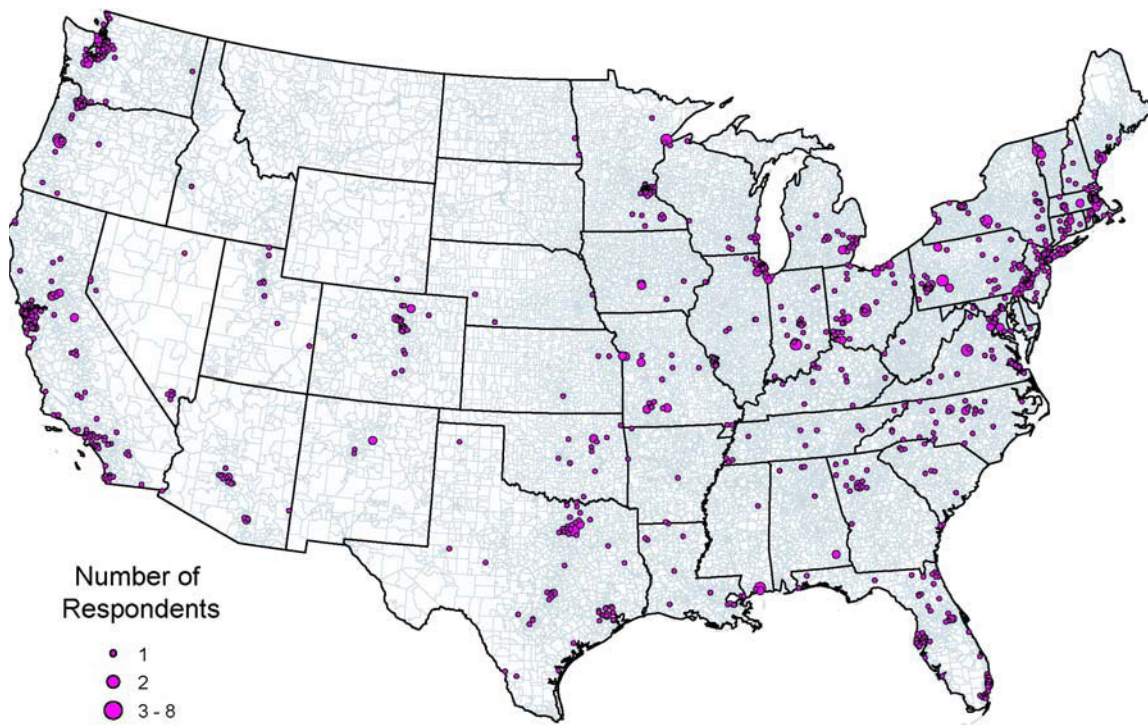


Table 1. Demographic Profile of Transgender Study Participants
(as compared to U.S. Census 2000; *N* = 1,229 transgender participants)

Demographic trait	Transgender survey data			Census 2000	
	<i>n</i>	%	Rank	%	Rank
State of residence (top 15) ^a					
California	154	12.5	1	12.0	1
Texas	64	5.2	6	7.4	2
New York	87	7.1	2	6.7	3
Florida	68	5.5	5	5.7	4
Pennsylvania	72	5.9	4	4.4	5
Illinois	37	3.0	10	4.4	6
Ohio	50	4.1	8	4.3	7
Michigan	25	2.0	16	3.5	8
New Jersey	29	2.4	15	3.0	9
Georgia	21	1.7	17	2.9	10
North Carolina	30	2.4	13	2.8	11
Virginia	30	2.4	13	2.5	12
Massachusetts	55	4.5	7	2.2	13
Indiana	28	2.3	15	2.2	14
Washington	75	6.1	3	2.0	15
Age					
18–19	98	8.0	3.8		
20–29	520	42.4	18.3		
30–39	263	21.4	20.8		
40–49	199	16.2	20.6		
50–59	120	9.8	14.7		
60+	27	2.2	21.9		
Race/ethnicity					
White (non-Hispanic)	966	78.6	71.9		
Black (non-Hispanic)	34	2.8	11.1		
Hispanic	50	4.1	11.0		
Asian	16	1.3	3.7		
American Indian or Alaska Native	14	1.1	0.7		
Native Hawaiian or other					
Pacific Islander	3	0.2	0.1		
Other	45	3.7	0.1		
Multi	101	8.2	1.4		
Education					
Less than high school	25	2.0	20.3		
High school graduate/GED	134	10.9	28.6		
Some college	526	42.8	51.5		
College (bachelor degree)	306	24.9	14.4		
Trade/tech-vocational school	53	4.3	— ^b		
Graduate/professional school	152	12.4	7.8		
Other	33	2.7	— ^b		
Household income					
0–19k	302	25.2	22.1		
20–39k	363	30.2	25.3		
40–59k	230	19.2	19.7		
60–79k	112	9.3	10.4 ^c		
80–99k	61	5.1	10.2 ^d		
100–149k	95	7.9	7.7		
150k+	38	3.2	4.6		
Income sources ^b					
Employment (full- or part-time)	1,024	83.3			
Spouse/partner	208	16.9			
Other family member	235	19.1			
Alimony/child support	17	1.4			
Unemployment insurance	90	7.3			
Social Security/disability	104	8.5			
General assistance	27	2.2			
Food stamps	67	5.5			
Sex for pay	46	3.7			
Other	169	13.8			

Table 1. (Continued)

Demographic trait	Transgender survey data			Census 2000	
	<i>n</i>	%	Rank	%	Rank
Marital status					
Married	224	18.2	51.1		
Legal civil union	17	1.4	— ^b		
Widowed	7	0.6	6.6		
Divorced	151	12.3	9.8		
Separated	37	3.0	5.4		
Single, never married	792	64.5	27.1		
Religious affiliation ^c					
No formal religion	502	41.3	14.2		
Catholic	145	11.9	24.5		
Protestant other	135	11.1	43.2		
Jewish	58	4.8	1.4		
Protestant Evangelical	45	3.7	0.5		
Buddhist	35	2.9	0.5		
Mormon	6	0.5	1.3		
Islam/Moslem	4	0.3	0.5		
Hindu	3	0.3	0.4		
Other	282	23.2	14.4		
Residential location					
Rural	93	7.6	21.0 ^f		
Small town	248	20.2			
Medium-sized city	353	28.8	10.7 ^g		
Metropolitan area	495	40.3	68.4 ^h		
Other	39	3.2			

^aNumber and ranking for states in the survey where transgender participants appeared to be overrepresented relative to population size were Minnesota (*n* = 50, 8th); Oregon (*n* = 42, 9th); Missouri (*n* = 34, 11th); and Colorado (*n* = 31, 12th). ^bIndicates not available in census tabulations. ^cCensus category only to \$75k. ^dCensus category \$75k–\$99k. ^eData from Statistical Abstract of the United States, Table No. 79. ^fProbably includes small town too. ^gCensus Urban Cluster. ^hCensus Urbanized Area.

less likely to be currently married); were more likely to report no formal religion (and less likely to be affiliated with major religious denominations); and were less likely to live in major metropolitan areas (see Table 1). Examining the income discrepancy further, major sources of income were employment (83%), another family member (19%), and spouse (19%). Only 8% reported being on Social Security or disability; less than 4% reported engaging in sex for payment.

Table 2 reports the differences between transgender identity types on demographic variables. With the exception of employment, significant differences at the $p = .05$ or higher levels were found between these identity types on all demographic variables. In Table 3, we aggregated these data to test our *a priori* hypotheses. Consistent with our predictions, male-to-females were significantly older, more educated (as measured by percentage with college degree), and more likely to have children than female-to-males. In addition, male-to-females were more likely than female-to-males to report being White, being married, and having a greater household income, but they also reported significantly less employment (by self) and formal religion, and fewer were residing in a metropolitan area.

Across types of transgender identity, only the hypotheses that cross-dressers would be more likely than other transgender identity groups to be religious, to be married, and to have children were confirmed, although no differences were found in education levels. Cross-dressers appeared to be significantly older and reported greater household income than other transgender groups. Against prediction, transsexuals, not drag queens, were the group most likely to report living in a metropolitan area.

Discussion

The significance of this study lies in its innovative enumeration of a hidden population using new methods afforded by the Internet. Our first aim, to conduct a large-scale study to quantitatively assess transgender demographics in the United States from a national sampling frame, appears to have been successful. Whereas several offline studies (Clements-Nolle et al., 2001; Nemoto et al., 2004) have successfully investigated HIV risks among more “out” individuals and more visible populations (e.g., gay men, people with HIV), we believe that Internet-based research can advance the study of individuals who are more closeted, sexual minorities that are more hidden, and sexual concerns

Table 2. Demographic Characteristics by Type of Transgender Identity
N = 1,229 transgender participants

Demographic characteristic	Transsexual		Drag		Cross-dresser		Other ^a	
	Male to female	Female to male	Queen (male to female)	King (female to male)	Male to female	Female to male	Male to female	Female to male
n	278	262	54	54	188	30	177	186
%	22.6	21.3	4.4	4.4	15.3	2.4	14.4	15.1
Age (mean)	37.20	28.00	29.30	24.50	42.70	25.60	35.50	24.50
Household income (mean/1k)	49.05	39.40	48.67	37.27	65.36	27.07	47.33	32.45
Percent non-Hispanic White	80.60	75.60	79.60	87.00	84.60	63.30	74.60	77.40
Percent college degree	38.50	35.10	35.20	35.20	47.30	13.30	39.60	31.20
Percent employed	78.40	85.50	87.00	90.70	86.20	80.00	79.10	86.00
Percent no formal religion	36.30	45.00	48.20	35.20	29.80	43.30	37.30	55.40
Percent married	20.90	9.20	1.90	3.70	47.30	6.70	24.30	2.70
Percent with children	34.50	11.50	5.60	13.00	57.50	20.00	29.40	7.00
Percent residing in metro area	42.10	48.50	40.70	38.90	31.90	26.70	40.10	37.10

^aIncludes transgenderist, bigender, gender queer, and identities other than transsexual, cross-dresser/transvestite, or drag impersonator.

Table 2. (Continued) Summary: Demographic Characteristics by Type of Transgender Identity

Demographic characteristic	All	p value ^a
n	1,229	
%	100.00	
Age (mean)	32.74	<.001
Household income (mean/1k)	45.67	<.001
Percent non-Hispanic White	78.60	.045
Percent college degree	37.27	.006
Percent employed	83.32	.073
Percent no formal religion	40.85	<.001
Percent married	18.23	<.001
Percent with children	25.63	<.001
Percent residing in metro area	40.28	.022

^ap values from one-way ANOVA or chi-square test, depending on measurement scale of outcome variable.

of limited incidence. The anonymity, reach, and decreased burden on respondents that are inherent in Internet-based studies—where participants can complete a survey at times and places, as well as in the speed and manner, of their own choosing—all predict greater participation for online versus offline studies. The Internet may be the only way to reach certain sexual minorities for advancing policy, and it offers new methods (e.g., online commentary, focus groups, consultations) by which minorities can inform and help shape policy. In particular, research on populations not in care (e.g., uninsured people, clinical populations not in treatment), long-term follow-up studies of treatment effects, and studies of socially proscribed sexual interests and concerns may all be advanced using rigorous Internet methods. Indeed, the more hidden the population, the more likely Internet-based methods may be the appropriate or only way to research a sexual minority (broadly defined).

Online research methods provided us with a unique opportunity to recruit a national, nonclinical sample of transgender people in the United States and, thus, to gain a first glimpse at the demography of transgender persons nationally. The geographic distribution of participants as shown in Figure 1 clearly showed that the study was successful in recruiting participants from a wide area. Furthermore, the participation of people from Puerto Rico, the Virgin Islands, most smaller states, many rural areas, and the military zip code for Europe demonstrates a powerful advantage of online studies: the ability to recruit successfully from populations often excluded due to geographic isolation. Although it is beyond the scope of this study to investigate why geographic differences were found between the demography of transgender people and the demography of the U.S. population in general, possible explanations include a genuine difference in demography, differences in Internet versus offline sampling, an artifact of the research design, or some combination of the aforementioned and other factors.

Comparison of demographic findings across Internet studies is important to identify common strengths and potential biases in methodology. Participation by transgender persons in this study appeared similar to a recent online study we conducted of Latino men who used the Internet to seek sex with other men (Rosser et al., 2005). Although the populations were different for each study, both online samples showed common features: Participation was in rough proportion to the size of the state, and both studies showed good participation by geographically isolated people.

Our second aim for this study was to describe the basic demographic characteristics of a large sample of

Table 3. Demographic Characteristics by Sex and Type of Transgender Identity
(*N* = 1,229 transgender participants)

Demographic characteristic	Sex		<i>p</i> value ^b	Type of transgender identity				<i>p</i> value ^b
	Male to female	Female to male		Transsexual	Drag	Cross-dresser	Other ^a	
<i>n</i>	697	532		540	108	218	363	
%	56.70	43.29		43.9	8.8	17.7	29.5	
Age (mean)	37.3	26.8	<.01	32.7	26.9	40.4	29.9	<.001
Household income (mean/1k)	52.1	37.3	<.01	44.3	43.0	60.0	39.8	<.001
Percent non-Hispanic White	80.6	75.9	.05	78.2	83.3	81.7	76.0	.247
Percent college degree	40.9	32.5	<.01	36.9	35.2	42.7	35.3	.311
Percent employed	81.6	85.5	.07	81.9	88.9	85.3	82.6	.262
Percent no formal religion	34.7	48.9	<.01	40.6	41.7	31.7	46.6	.006
Percent married	27.5	6.0	<.01	15.2	2.8	41.7	13.2	<.001
Percent with children	37.7	9.8	<.01	23.3	9.3	52.3	17.9	<.001
Percent metro	38.6	42.5	.17	45.2	39.8	31.2	38.6	.004

^aIncludes transgenderist, bigender, gender queer, and identities other than transsexual, cross-dresser/transvestite, or drag impersonator.

^b*p* values from unequal variance *t*-test.

transgender persons and to demonstrate the utility of careful demographic analysis. When we compared our sample of transgender participants to data from the U.S. Census, some interesting differences emerged (see Table 1). Our sample appeared disproportionately more likely to identify themselves as White (non-Hispanic), more highly educated, and single never married, and they were also more likely to report no affiliation with traditional religious groups. Some of these demographic differences were reliably reported by studies with other sexual minorities, in particular offline samples of gay and bisexual men (Laumann et al., 1994; Rosser, 1991b), as well as early online studies of men who use the Internet to seek sex with men (see Rosser et al., 2004, in press). Hence, we speculate that these demographic characteristics are likely to be stable and thus could be replicated in future studies.

In terms of policy, legal constraints preventing transgender persons in some states from marrying, as well as laws against same-sex marriage, are the simplest explanations for the low marriage rates in our sample. Because marriage has been identified as having a significant protective effect on mental, emotional, and economic health (Umberson & Williams, 1999; Waite & Gallagher, 2000), marriage becomes not only a civil rights issue but also a public health issue. Similarly, the transphobia associated with many traditional religions may help explain the lower rates of religious affiliation in the sample—results that mirror findings for gay men (Rosser, 1991a, 1991b).

That greater education is not matched by greater household income is also an interesting finding. Reports

of employment discrimination against transgender persons are common and may have contributed to this result (Bockting, 2003; Keatley, 2003). Alternatively, the lower income may be associated with less urban residence or attributed to some third common variable or combination. Regardless of their source, these demographic differences have clear implications for research, health delivery, and policy. With less income (especially if it is associated with residence in rural areas), transgender persons are less likely to participate in conventional studies; hence, the number of people with transgender status is likely to remain underestimated in the United States. Similarly, less income and less urban residence would predict less ability to access and receive specialized health services from providers competent in transgender health care. Regarding policy, greater education but less income may also be a marker of social discrimination. If so, advocating for legal protections in employment and equal pay across all genders may help advance the health of this population.

Table 2 shows some common demographic patterns for transsexuals, drag queens and kings, cross-dressers, and other transgender persons. Across groups, compared with their female-to-male counterparts, the male-to-female transgender participants appear consistently older, have more income, report higher education, are more affiliated with religion, and are more likely to be married (with children). Drag queens and kings appear to be the exception, possibly because this group is most likely to also identify as gay or lesbian, respectively. As shown in Table 3, when aggregated, clear differences emerge both by sex and by type of transgender identity. The higher

income and greater education of male-to-females than female-to-males may in part explain why more male-to-females than female-to-males present seeking transgender-specific health care services in the United States. However, other explanations are also possible. For example, within transsexuals, female-to-male participants were more likely to be employed, but they earned less. One possible explanation may be that female-to-male survey respondents had less education and therefore might have lower-wage jobs. However, age appears to be a confounder with income and education in our study. Male-to-female and female-to-male transgender persons may experience differences in social stigma; the limited feasibility of creating a functioning and aesthetically pleasing penis compared with the superior outcome of male-to-female genital reconstructive surgery may also contribute to gender differences in seeking transgender-specific health care services.

In the United States, gender inequity in employment continues, with women earning on average 81 cents for each dollar a man earns in a similar position (U.S. Department of Labor, 2006). Our results suggest this gender inequity may be amplified among transgender persons: Female-to-males earn 62 cents for each dollar their male-to-female counterparts earn. Given the absence of universal health care in the United States, the cost of health insurance, and exclusions specific to transgender health needs, transgender-specific and transgender-competent health care may simply be beyond the economic resources of many female-to-male transgender Americans.

The differences in metropolitan residence across types of transgender identity probably reflect differences in priorities related to identity. Transsexuals are, by definition, the group most motivated in pursuing hormone therapy and sex reassignment surgery, actions that, in turn, may increase the likelihood of their residing close to specialized clinics and professionals who provide such services (usually in urban areas). Drag and impersonation are usually done for entertainment and employment, making it more likely that those who identify themselves as drag queens or kings or impersonators reside in metropolitan areas where drag shows are common. Alternatively, a rich variety of transgender expression may interact with key demographics: For example, older male-to-female urbanites have both more income and more access to clinical services, which may in turn influence their decisions regarding how they see themselves and seek to express their transgender identity.

Finally, this study demonstrates the importance of using Internet-based research to supplement community-based and clinical studies. Reliance on clinical and

community-based studies alone appears to systematically bias results by overincluding transsexuals, underrepresenting those not under the care of a physician or a mental health professional, and excluding those residing outside of metropolitan areas. Our data on income bear this out: More than 25% of the participants in this study reported a household income under \$20,000, a figure independently confirmed by a similar percentage of respondents reporting sources of income including unemployment benefits, disability, general assistance, and food stamp programs. Internet studies would appear to be an important and feasible approach in enabling comparisons of people in care versus those out of care, health care disparities across race and ethnicity, and urban versus rural samples. These are areas for future research.

Internet-based survey research is a new methodology: At every stage of this study, we found ourselves having to develop protocols to establish rigor, including protocols for online advertising, screening methodologies, human consent procedures, identity cross-validation and deduplication, data security and transfer, and payment. The biases and vulnerabilities of Internet sampling and, in particular, how these factors intersect with demographic variables may be hypothesized (e.g., biases toward more literate and higher-income people and against infrequent, atypical, and non-Internet users; see also Pequegnat et al., in press, for a review). Gossling, Vazire, Srivastava, and John (2004) compared offline and online samples to test preconceptions about Internet research; they showed that Internet samples are relatively diverse with respect to gender, socioeconomic status, geographic region, and age. Nevertheless, online studies may access different populations than offline studies. Seven Internet-based studies of gay men—two comparative online-offline studies in Sweden (Ross, Månsson, Daneback, Cooper, & Tikkanen, 2005; Ross, Tikkanen, & Månsson, 2000); two in the United Kingdom (Davis, Bolding, Hart, Sherr, & Elford, 2004; Elford, Bolding, Davis, Sherr, & Hart, 2004); and three in the United States (Horvath, Beadnell, & Bowen, 2006; Horvath, Bowen, & Williams, 2006; Rosser et al., 2006)—demonstrated that online samples of sexual minorities would appear to disproportionately recruit participants who are younger, in school, better educated, less likely to be in monogamous relationships, and more likely to be seeking sexual partners. Online studies also seem to be more advantageous for recruiting those who are geographically isolated, homebound, disabled, and members of the military on active duty, as well as others prevented from participation in offline studies by geography, work, time, or

mobility issues (see Pequegnat et al., in press). Thus, to the degree that this study of transgender persons replicates similar findings, two conclusions are clear. First, the sampling frame, not the population, is the most likely explanation for these specific demographics. Second, careful reporting of a sample's demography can help identify likely biases across studies and methodologies.

The lack of comparative studies of transgender people prevents us from situating these findings within a comprehensive literature. Hence, all findings should be viewed within the limitations of a study breaking new ground: They provide us with an important first picture of a community, but they need replication across settings (in this case, countries) to test generalizability and across time to test stability before being accepted as valid and stable. Because recruitment was stratified by type of transgender identity, participation by sex and transgender type cannot be used to provide comparative estimates of the size of these subgroups in the United States. Hence, studies of transgender persons using open-entry criteria are a logical next step in examining the demography of this population. Finally, because this demographic study of transgender persons was done online, it is not possible to distinguish which demographic differences between this sample and the general population (see Table 1) could be attributed to transgenderism, to sampling via the Internet, to a combination of factors, or to yet other factors.

Understanding the demographic characteristics of a population is critical in an empirical approach to identifying health risks, ensuring adequate health care, and developing appropriate health policy. Although much debate among researchers in the United States has centered on the ability of Internet research to recruit representative samples, the issue is moot for research with transgender people and many other sexual minorities because no offline representative samples exist. Furthermore, the methods used to obtain representative samples (e.g., geographically stratified household surveys, random telephone surveys) appear economically, practically, and socially unfeasible for this population. Internet-based transgender research using different designs and recruitment protocols, replicated across countries with triangulation of results, appears to be a promising, feasible strategy to advance research with transgender people and other hidden sexual minorities. This study has demonstrated that Internet-based research is a successful, potentially superior new strategy for recruiting hard-to-reach and hidden populations, for identifying the demographic characteristics of such populations, and for

recognizing policy implications—all of which are possible only with large-sample research. Clearly, more research is needed to establish the reliability and validity of these findings, especially as they apply to this population and other minorities. As Internet-based research becomes more commonplace, key e-demographics must necessarily be standardized, guidelines for conducting online research should be identified, and the drive for developing ever more rigorous methods needs to be encouraged.

Acknowledgments

This study was part of a larger project funded by a grant from the National Institute on Drug Abuse (1R01-DA15269). The authors wish to thank Gail Babes for assistance in researching the literature, as well as Anne Marie Weber Main, Heather Haley, and Carol Raichert for their review and helpful suggestions for improving the manuscript. Thanks also to the members of the study's Transgender Community Advisory Board for their input on every stage of the design and implementation of the online survey.

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